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ABSTRACT

Selected data from three of the latest summary reports of the College Board's Admissions Testing Program (ATP) are presented. They are: College Bound Seniors, 1980-National, Midwestern, and Indiana. Data including Scholastic Aptitude Test (SAT) scores, the Test of Standard Written English (TSWE) scores, and information from the Student Descriptive Questionnaire (SDQ) were compared to identify differences and similarities between the three populations. Highlights of relationships include: (1) the higher the proportion of students taking the SAT tests, the lower the SAT mean scores, the lower the self-reported high school mean grades, the lower the mean high school grade point average, and the lower the self-reported class rank; (2) in Indiana where the highest proportion of high school students took the SAT test, the annual parental (mean) contribution towards applicants' education was lowest, annual parental (mean) income and parental contribution toward education by applicants' SAT score averages were lowest, and a higher proportion indicated their planned degree level to be two years whereas a smaller proportion planned graduate study. (RL)

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A COMPARISON STUDY OF THE
COLLEGE BOARD SCHOLASTIC APTITUDE TEST SCORES
BETWEEN STUDENTS IN INDIANA, THE MIDWESTERN REGION,
AND THE NATION

INCLUDES TEST SCORES, HIGH SCHOOL RECORDS,
SOCIOECONOMIC CHARACTERISTICS, AND COLLEGE PLANS



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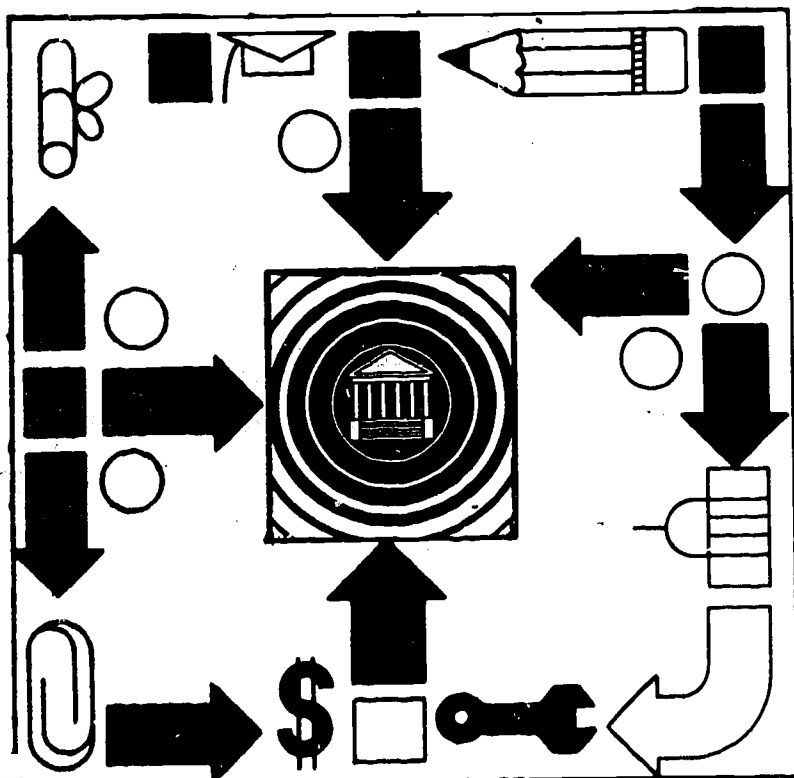
J. P. Lisack

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MONOGRAPH 80-1

10 November, 1980

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PURPOSE AND DESCRIPTION OF THIS MONOGRAPH

PURPOSE

The purpose of this report is to present some pertinent facts about Indiana's high school seniors' College Board Admission Testing Program results. There is much need for this information to facilitate rationale and responsible actions.

ABOUT THE COLLEGE BOARD*

The College Board is a nonprofit national membership association. Among the College Board's major service areas are the testing of high school students for college admission, credit, and placement, as well as the provision of descriptive student information. Nearly one million high school seniors participated in the College Board's Admissions Testing Program (ATP). There they met the Scholastic Aptitude Test (SAT), the Test of Standard Written English, and the Student Descriptive Questionnaire (SDQ). Through their participation, they created a pool of information about themselves which is published by the College Board in a series of summary reports.

ABOUT THIS REPORT

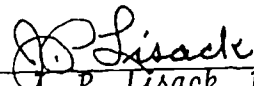
This particular monograph is based on selected data extracted from three of the latest summary reports. They are: College Bound Seniors, 1980, NATIONAL; College Bound Seniors, 1980, MIDWESTERN; and College Bound Seniors, 1980, INDIANA. Essentially, comparisons of data are made to identify differences and similarities between these three populations. Highlights and some observations are developed by the author.

A Summary is provided (on canary colored pages) for the convenience of readers. Other related materials are included as attachments.

ACKNOWLEDGEMENTS

Appreciation is expressed to Arthur Doyle, Director of Midwest Research, and John Vaccaro, Associate Regional Director of The College Board*, for their cooperation. Also, appreciation is expressed to Ms. Linda Achgill for the preparation of the tables and typing of this report.

The author takes sole responsibility for any errors or interpretation of data in this report.


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COMPARISONS OF COLLEGE BOARD ATP SUMMARY REPORTS
NATIONAL, MIDWESTERN, AND INDIANA*
 1979-80 COLLEGE-BOUND HIGH SCHOOL STUDENTS

This report is based largely on data taken from the most recent College Board ATP records of 1978-79 seniors who registered for SAT tests at any time during their high school years. The March 1980 administration is the most recent one from which records are included. Numbers in this report for the three areas covered were:

| Indiana | | | Midwestern | | | National** | | |
|---------|--------|--------|------------|--------|---------|------------|---------|-----------|
| Male | Female | Total | Male | Female | Total | Male | Female | Total |
| 17,812 | 20,866 | 38,678 | 67,988 | 70,355 | 138,343 | 504,390 | 534,002 | 1,047,392 |

*The College Board, 500 Davis Street, Evanston IL 60201.

**See Attachment 1 for HIGHLIGHTS of the College Board NATIONAL REPORT - 1980.

COLLEGE BOARD TRENDS

High school seniors scored lower on the Scholastic Aptitude Test (SAT) again in 1979-80, continuing a decline that began 17 years ago. The nearly one million college-bound seniors who took the '79-'80 test averaged 424 in verbal and 466 in math, down three points and one point respectively from a year earlier. Indiana seniors scored 407 verbal and 450 math, down five points in both subjects from a year earlier. (The 2½ hour, multiple choice test was created in 1941 to fit a scale of 200-to-800 with the average score expected to be 500.)

About half the three million students who graduated from high school last June are now in college, and two-thirds took the SAT. The College Board estimated that if every high school senior took the SAT, the average verbal score would be 368 and math 402.

INDIANA SAT SCORES VS. MIDWESTERN
AND NATIONAL AVERAGES

The fact is that a much greater proportion of the Indiana high school seniors take these tests. For example, in the 1979-80 test, 106% of the estimated college-bound Indiana seniors took the test (i.e., six percent more than the number estimated to go to college): This compares with the National average of 64%. Data show that the higher the proportion of high school seniors who take the tests, the lower their average scores will be. See ATTACHMENT II for a series of tables and figures that illustrates this relationship. This relationship is not only apparent in test scores, it carries over into high school records, socioeconomic characteristics, and college plans.

AMERICAN COLLEGE TESTING PROGRAM 4

The same relationship between proportions of students taking tests and scores achieved is supported in the ACTP--where the proportions of Indiana students taking the tests are lower than the National averages, but their scores are higher. (See Attachment III.)

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(On canary colored paper)

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SUMMARY

TEST SCORES

For the past ten years, the verbal and math score averages of the College Board Scholastic Aptitude Tests (SAT) for high school seniors in the Midwestern Region have consistently been higher than the National averages--and Indiana students have scored the lowest.

However, during this entire period, a much higher proportion of estimated college-bound high school students in Indiana took the SAT tests than did the proportions of college-bound high school students in the Midwest or Nationally.

Males had higher (mean) verbal and math SAT scores, but females excelled on the Test of Standard Written English.

HIGH SCHOOL RECORD

Students in all three geographic groups reported their highest grades in high school to be in social studies, followed by English and bio-sciences: the lowest grades were in math and physical sciences.

High school students in the Midwestern Region reported the highest grades: Indiana students scored lower than the Midwestern averages in all subjects. Indiana students were also lower than the National averages in all subjects except foreign languages--where they were slightly higher--and in the bio-sciences, where they were even.

The most number of years of study in high school (for all students) was in English, followed by math, then social studies; the least time was in bio-sciences and physical sciences. Indiana students reported fewer years' of study in every subject listed. Although math was ranked the second highest (longest) in years of study, it ranked sixth (the lowest) in reported grades: the highest grades were reported in social studies which ranked third in years of study.

The large majority of students taking the SAT tests had a grade point average in high school at or above the "D" level. Midwestern Region students were highest (64.5% at >B), the National average was 58.2% with Indiana at 55.7% at the B average or higher.

Nearly 90% of the Indiana students taking the tests were enrolled in public high schools--this contrasts sharply with Midwestern and National groups--which were made up of nearly 20% non-public students.

SUMMARY (CONTINUED)

SOCTOECONOMIC CHARACTERISTICS

About 10% of the high school students in both Indiana and the Midwestern Region who took the SAT tests are members of minority groups; this compares with about 18% Nationally. The largest single minority group is made up of black students (~7% throughout the Midwest and 9% Nationally).

Overall, more minority group females than males took the SAT tests--with one exception, more Oriental males took the test than females.

The lowest parental income and parental contribution toward applicants' education were for blacks, next lowest were Puerto Rican, then Mexican American: the highest were for whites followed by Oriental, then American Indian. In general, Midwestern parental incomes and parental contributions were highest, with the lower Indiana averages being more comparable with the Nation at large.

There is a direct relationship between SAT scores and the annual parental income and parental contribution toward education: the higher the income and contribution; the higher the SAT scores. The mean annual parental income and contribution of Indiana parents are below the Midwestern and National means. (The reader is reminded that a much higher proportion of Indiana high school students take the SAT tests.)

COLLEGE PLANS

Proportionately, nearly twice as many Indiana students taking the SAT tests indicate their planned degree level to be two-year training program or associate degree as compared to Midwestern or National averages (~10% in Indiana vs. 5% of others). More females than males chose the two-year level in all three geographic groups.

About 31% of all students in the three geographic groups chose the BA or BS degree level.

Whereas Indiana is highest at the two-year program level, it is lowest at the graduate study level (32% for Indiana vs. 46% for the Midwest Region and 42% Nationally). In all three regions, more males than females reported graduate level degree goals. A higher proportion of Indiana students than in the other two groups, were undecided as to their planned degree level.

SUMMARY (CONTINUED)

COLLEGE PLANS (CONTINUED)

There is a striking similarity among the three geographic groups concerning students' plans to ask the college for special assistance. Approximately 57% report they will need assistance in getting part-time work, 55% need educational counseling and 28% need vocational and career counseling. About 22% need help in developing study habits, 16% need help in math, 13% in writing and 12% in reading. Fewer than 4% said they would ask for personal counseling. (Students could make more than one choice.)

The five most recently chosen areas of study in all three geographic groups are:

- (1) Business & Commerce--popular with both sexes
- (2) Health & Medical--popular with both sexes
- (3) Engineering--more popular with male students
- (4) Education--more popular with female students
- (5) Social Sciences--popular with both sexes
- (5) Computer related--more popular with male students.

There is a remarkable similarity in the rank orders of SAT verbal and math (mean) scores in the five most popular intended major areas of study in all three geographic groups. These are:

| <u>Intended Area of Study</u> | <u>SAT Score Rank</u> |
|-------------------------------------|-----------------------|
| Physical Sciences & Related Areas | 1st (highest) |
| Bio-Sciences & Related Areas | 2nd |
| Arts & Humanities | 3rd |
| Social Sciences and Related Areas | 4th |
| Business, Commerce & Communications | 5th |

Students with the highest math SAT scores chose math, physical science, engineering, computer science, and biological science. The few chosen fields of study where verbal SAT scores are higher than math scores include foreign languages, music, theater arts, and library science.

About 25% of the students taking SAT tests plan to apply for advanced placement in English, 20% in math, 14% in foreign languages, 12% in social studies and 10% in physical sciences, 8% in bio-sciences and 7% in art and music. In general, a lower percentage of Indiana students planned to apply for advanced placement than did Midwestern students or the Nation as a whole.

The majority of students prefer to live in a campus dormitory (males preferring coed and females preferring single-sex dorms). The least popular choice for both Indiana and Midwestern Region students was off-campus apartments; however, the least popular Nationally was fraternity or sorority.

SUMMARY (CONTINUED)

[RELATIONSHIPS]

- I. There are a number of salient relationships between the proportions of college-bound students and (1) SAT test scores, (2) high school records, (3) socioeconomic characteristics, and (4) college plans. These relationships include:

The higher the proportion of students taking the SAT tests, the lower the SAT mean scores (A are statistically significant) the lower the self-reported high school (mean) grades in English, math, foreign languages, bio sciences, physical sciences, and social studies the lower the (mean) high school grade average the lower the self-reported class rank.

NOTE: In all of the above instances, data for Indiana students where the proportion of high school students taking the SAT tests were high, show a more even distribution across entire ranges or spans, whereas where the proportions of students taking the SAT tests were lower (i.e., the Midwestern Region and Nationally), the data were skewed more to the high side of the ranges or spans.

- II. It is also noteworthy that in Indiana where the highest proportion of high school students took the SAT tests:

annual parental (mean) income was lowest
estimated parental (mean) contribution towards applicants' education was lowest
annual parental (mean) income and parental contribution toward education by applicants' SAT score averages were lowest
a higher proportion indicated their planned degree level to be two years and a smaller proportion planned graduate study (and a higher proportion were undecided).

NOTE: There is a direct relationship between parental income as well as parental contribution, with SAT scores: the lower the income/contribution, the lower the score.

- III. The premise developed on SAT score data that the higher the proportion of high school students in a given population taking the college (admissions) test, the lower their mean scores will be, is supported by ACTP* results as well. In that case the proportion of Indiana students taking the tests was lower, but their test scores were (statistically) significantly higher for all subjects and composite scores. (See Attachment III.)

NOTE: The statistical correlations in this study indicate the relationship between a) the proportion of estimated college-bound students within a given population (e.g., state) who take the standardized admissions tests, and b) the average score, in the state, of those students on the tests. Because the correlations are all very high negative values, it is clear that large proportions taking a test are closely related to low average scores achieved on the test.

*American College Testing Program

[1. TEST SCORES]

TABLE 1
SAT SCORES AND
PERCENTAGE OF ESTIMATED COLLEGE BOUND STUDENTS
TAKING TESTS
(Mean Test Scores)

| | INDIANA N=37,262 | | | MIDWESTERN N=130,200 | | | NATIONAL N=991,514 | | |
|-----------|------------------|------|------|----------------------|------|-----|--------------------|------|-----|
| | VERBAL | MATH | %* | VERBAL | MATH | %* | VERBAL | MATH | %* |
| Mean | 407 | 450 | 100% | 446 | 495 | 93% | 424 | 466 | 64% |
| Std. Dev. | 99 | 110 | | 108 | 118 | | 110 | 117 | |

*Students taking tests as % of estimated college bound population

HIGHLIGHTS (Table 1)

The verbal and math scores of Indiana's students are lower than both the National and Midwestern Regional mean scores; however, the estimated proportion of Indiana's college bound students who took the tests is much higher. An analyses of verbal and math SAT scores reveal that these differences between the three geographical regions are statistically significant. Correlational analyses were applied in order to attempt to account for these differences. Very high negative values were found indicating that large proportions of students taking the tests are closely related to low average scores on the test. (See Attachment II for comparative data and see Attachment IV for details of statistical analysis.)

NOTE: Attachment II on pages 23 thru 27 present comparative data on the relationships of SAT scores and estimated percentage of college-bound students. Attachment III presents comparable relationships data for the ACTP tests.

TABLE 2
SAT SCORES BY SEX
(Mean Test Scores)

| | INDIANA N=37,262 | | | | MIDWESTERN N=130,200 | | | | NATIONAL N=991,514 | | | |
|-----------|------------------|-----|------|-----|----------------------|-----|------|-----|--------------------|-----|------|-----|
| | VERBAL | | MATH | | VERBAL | | MATH | | VERBAL | | MATH | |
| | M | F | M | F | M | F | M | F | M | F | M | F |
| Mean | 411 | 404 | 476 | 428 | 451 | 441 | 520 | 467 | 428 | 420 | 491 | 443 |
| Std. Dev. | 99 | 100 | 113 | 103 | 108 | 109 | 119 | 111 | 110 | 110 | 120 | 109 |

TABLE 3
TEST OF STANDARD WRITTEN ENGLISH (TSWE) SCORES
(Mean Test Scores)

| | INDIANA N=37,262 | | | MIDWESTERN N=130,200 | | | NATIONAL N=991,514 | | |
|-----------|------------------|--------|-------|----------------------|--------|-------|--------------------|--------|-------|
| | Male | Female | Total | Male | Female | Total | Male | Female | Total |
| Mean | 39.8 | 41.5 | 40.7 | 43.8 | 45.0 | 44.4 | 41.7 | 43.0 | 42.4 |
| Std. Dev. | 10.5 | 10.3 | 10.4 | 10.6 | 10.3 | 10.5 | 11.0 | 10.8 | 11.0 |

HIGHLIGHTS (Tables 2 and 3)

Males had higher verbal and math SAT scores than did females in all three geographic groups. (The number of women taking the tests exceeded that of men.) However, women excelled on the Test of Standard Written English.

NOTE: See Attachment 1 for the Summary Highlights taken from the National Report on College-Bound Seniors, 1980.

[11. HIGH SCHOOL RECORD]

TABLE 5
SELF-REPORTED GRADES BY SUBJECT
(Mean Grade) *

| Locale | English | Math | Foreign Languages | Bio- Sciences | Physical Sciences | Social Studies |
|--------|---------|-------|-------------------|---------------|-------------------|----------------|
| IND** | A-4.0 | C-2.8 | A-4.5 | A-4.0 | C-3.1 | A-4.1 |
| MW | A-4.5 | A-3.9 | A-4.5 | A-4.0 | A-3.6 | A-4.2 |
| NATL | A-4.5 | C-2.8 | A-4.5 | A-4.0 | C-3.1 | A-4.1 |

*A-4.0 B-3.0 C-2.0 D-1.0 F-0

**IND is Indiana, MW is Midwestern Region, and NATL is National.

NOTE: Females reported higher grades in all subjects except in math and physical science where results were very close or slightly in favor of males. (Sex data are not shown in above table.)

HIGHLIGHTS

In general all students reported their highest grades to be in the social studies, followed by English and bio-sciences; the lowest grades were reported for math and physical sciences.

Students in the Midwestern Region reported higher grades in every subject (than did Indiana students or National mean scores).

Indiana students reported lower grades in every subject except in two cases: (1) foreign languages -where Indiana grades were slightly higher than the National average (but below Midwestern), and (2) in bio-sciences where Indiana was the same as the National average but again was below the Midwestern grades.

(See TABLE 6 for Comparisons of Grades vs. Number of Years' Study.)

NOTE: An examination of the detailed statistics by individual grade in the Board report reveals that the percentage distribution of Indiana students is somewhat more evenly divided across all grades; grades are not skewed as sharply to the high side (i.e., A and B) as are those of the Midwestern Region and Nationally. This undoubtedly reflects the greater proportion of Indiana high school students who take the ATP tests. (See Table 1 and Attachment II.) (The specific grade details are available in the three College Board reports identified on the first page of this monograph.)

TABLE 5
NUMBER OF YEARS OF STUDY BY SUBJECT
(Mean Number of Years)

| <u>Locale</u> | <u>English</u> | <u>Math</u> | <u>Foreign Languages</u> | <u>Bio-Sciences</u> | <u>Physical Sciences</u> | <u>Social Studies</u> |
|---------------|----------------|-------------|--------------------------|---------------------|--------------------------|-----------------------|
| IND | 3.84 | 3.10 | 1.71 | 1.35 | 1.31 | 2.82 |
| MW | 3.97 | 3.44 | 2.07 | 1.37 | 1.73 | 3.01 |
| NATL | 3.96 | 3.47 | 2.17 | 1.40 | 1.77 | 3.20 |

NOTE: Females reported more years of study in English, foreign languages, and bio-sciences, while males reported more years' study in math, physical sciences and social studies. (Sex data are not shown in table above.)

HIGHLIGHTS

The most years of study were reported for English, followed by math, then social studies. The least time was spent in the bio-sciences and physical sciences.

Indiana students reported fewer years' study in every subject. (Note: previous research shows a gradual decrease in the proportion of Indiana students who are enrolled in college prep. type programs, with an increase in vocational education and general education; this may be one reason for the differences.) The Midwestern Region as a whole was lower in years of study in these subjects than the National averages.

(See TABLE 6 for Comparisons of Grades vs. Number of Years' Study.)

NOTE: An examination of the detailed data in the three College Board reports identified on the first page of this monograph, reveals that the distribution of percentages of Indiana students' numbers of years of study by subject, are somewhat more evenly spread from one to five years of study; the proportion of Midwestern and National students who have studied certain subjects for four years or more exceed those of Indiana students in all cases. This is undoubtedly due, at least in part, to the larger proportions of Indiana high school seniors who take these tests.

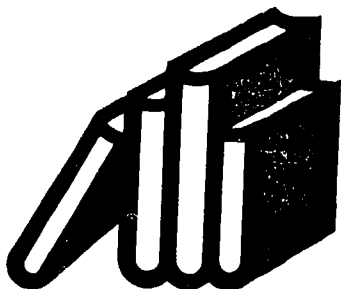


TABLE 6
COMPARISONS OF RANK ORDERS OF
SELF-REPORTED GRADES FOR ALL HIGH SCHOOL STUDENTS
VS
NUMBER OF YEARS OF STUDY--BY SUBJECT

| Subject | RANK ORDERS | |
|-------------------|----------------------|-----------------------|
| | Reported Grade | No. of Years of Study |
| Social Studies | 1st (Highest grades) | 3rd |
| English | 2nd | 1st (Most years) |
| Bio-Sciences | 3rd | 6th (Least years) |
| Foreign Languages | 4th | 4th |
| Physical Sciences | 5th | 5th |
| Math | 6th (Lowest grades) | 2nd |

HIGHLIGHTS

English, foreign languages and physical sciences had the closest rank relationships between reported grades and number of years of study.

The greatest misalignment of rank orders is in mathematics, where although math ranks second highest in number of years studied, the grades are ranked last. On the opposite side, the highest grades are reported in the social sciences which ranked only third in number of years studied: Bio-science grades were also favored, ranking 3rd in reported grade, but 6th in number of years studied.

TABLE 7
SELF-REPORTED CLASS RANK

| <u>Σ % With This Rank or Better</u> | <u>Top Tenth</u> | <u>Second Tenth</u> | <u>Second Fifth</u> | <u>Third Fifth</u> | <u>Fourth Fifth</u> | <u>Lowest Fifth</u> | <u>Median Percentile Rank</u> |
|-------------------------------------|------------------|---------------------|---------------------|--------------------|---------------------|---------------------|-------------------------------|
| INDIANA | 21.3% | 21.3% | 26.5% | 27.1% | 3.4% | 0.5% | 74.3% |
| MIDWESTERN | 28.5% | 22.8% | 24.5% | 21.4% | 2.6% | 0.4% | 80.4% |
| NATIONAL | 21.6% | 22.2% | 26.8% | 25.9% | 3.0% | 0.5% | 75.3% |

HIGHLIGHTS

The first observation of course is that the better high school academic achievers are taking the College Board tests. This is apparent when between 21 and 28% of the students taking the tests are in the top 10% of their class rankings (more than 70% of those taking the test are in the upper 40% of their class ranking). Conversely, fewer than one-half of one percent taking the test are in the lowest 40% of their class ranking.

The Midwestern Region reports the largest proportion of students in the higher class rankings (they also achieved the highest SAT scores): the National averages were next highest. Indiana reported the lowest proportions of students in the higher class rankings--and they achieved the lowest SAT scores.

Consistent with the above, the median percentile rank of Midwestern students was the highest and Indiana the lowest.

NOTE: See Table 9 for comparisons of class rankings, SAT scores, grade averages, and percent of estimated college-bound population taking the tests.

TABLE 8
ESTIMATED HIGH SCHOOL GRADE POINT AVERAGE
(Mean Grade)*

| Locale | 3.5-4.0 | 3.0-3.49 | 2.5-2.99 | 2.0-2.49 | <2.0 | Total |
|------------|---------|----------|----------|----------|------|-------|
| INDIANA | 26.9% | 28.8% | 24.5% | 15.5% | 4.4% | 100% |
| MIDWESTERN | 35.0% | 29.5% | 21.0% | 11.4% | 3.0% | 100% |
| NATIONAL | 27.7% | 30.5% | 24.4% | 13.8% | 3.7% | 100% |

*A=4, B=3, C=2, D=1

HIGHLIGHTS

The large majority of students taking the SAT tests had a grade point average at or above the "B" (3.0) level. The Midwestern Region students were highest (64.5% @ B or better), National average was next at 58.2%, and 55.7% of the Indiana students were at the B average or higher.

Nearly 20% of the Indiana students reported their grade point average to be below 2.5 (C+)...this compares with 17½% Nationally and only 14.4% for the Midwestern Region.

NOTE: See Table 9 for comparisons of high school grade point averages, SAT scores, high school rank, and percentage of estimated college-bound population taking the tests.

NOTE: An examination of the details in the three College Board reports shows that high school grade point averages for the Midwestern Region and Nationally are skewed to the high side. Indiana students' grades were somewhat more evenly distributed--which may reflect the higher proportions of Indiana high school students who take the tests.

TABLE 9
RELATIONSHIPS BETWEEN RELATIVE RANKINGS OF SAT SCORES, GRADE AVERAGES,
HIGH SCHOOL RANK, AND THE PERCENT OF ESTIMATED COLLEGE-BOUND POPULATION
TAKING THE SAT TEST

| ITEM | MIDWESTERN | | | NATIONAL \bar{x} | | | INDIANA | | |
|----------------|------------|-----|------|--------------------|-----|-----|---------|-----|-----|
| | HIGH | MID | LOW* | HIGH | MID | LOW | HIGH | MID | LOW |
| SAT SCORES | X | | | | X | | | | X |
| GRADE AVERAGE | X | | | | X | | | | X |
| H. SCHOOL RANK | X | | | | X | | | | X |
| % TAKING TEST | | | X | | X | | X | | |

*Represents the relative standing or ranking: highest, next highest (middle), and lowest.

HIGHLIGHTS

There is a noteworthy consistency in the SAT scores, grade averages, and high school ranks for each region; however, there is an inverse relationship of the ranking of these items to the proportion of estimated college-bound population taking the tests.

It is very apparent that if SAT scores, high school grade averages, and high school ranks are high, the percentages of students taking the test are low--and vice versa.

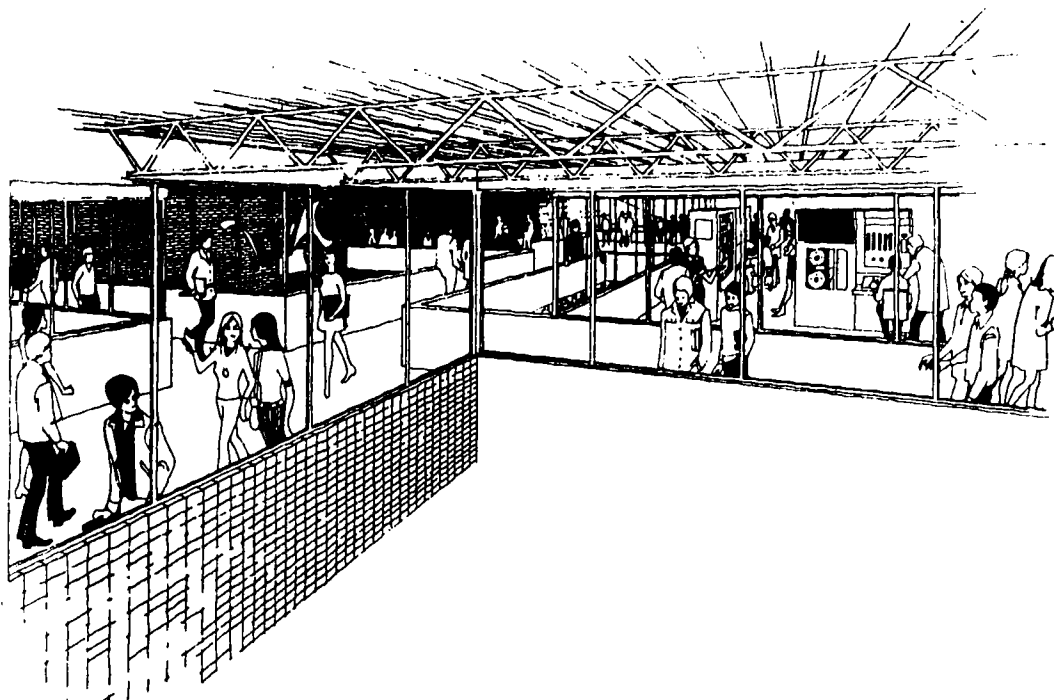
TABLE 10
TYPE OF HIGH SCHOOL

| | Indiana N=35,903 | Midwestern N=130,868 | National N=935,159 |
|--------|---------------------|-------------------------|-----------------------|
| Public | 89.9% | 81.0% | 81.8% |
| Other | <u>10.1%</u> | <u>19.0%</u> | <u>18.2%</u> |
| | 100 % | 100 % | 100 % |

HIGHLIGHTS

Nearly 90 percent of the Indiana students taking the College Board SAT tests were enrolled in public high schools. This contrasted sharply from the Midwestern Region and the Nation where the non-public school proportion was nearly twice as great.

NOTE: There was no way the grades and scores data could be associated with the type of high school.



III. SOCIOECONOMIC CHARACTERISTICS

TABLE 11
ETHNIC BACKGROUND
(% Distribution)

| Locale | Amer. Indian | Black | Mexican American | Oriental | Puerto Rican | Other | White | Total Minority Students |
|--------|-----------------|-------|---------------------|----------|-----------------|-------|-------|-------------------------------|
| IND. | 0.4% | 6.6% | 0.8% | 0.6% | 0.4% | 0.6% | 90.7% | 9.3% |
| MW | 0.4% | 7.2% | 0.5% | 1.3% | 0.3% | 1.0% | 89.3% | 10.7% |
| NATL | 0.5% | 9.1% | 1.7% | 3.2% | 1.1% | 2.3% | 82.1% | 17.9% |

*INDIANA N=35,105, MIDWESTERN REGION N=128,385, NATIONAL N=911,397

HIGHLIGHTS

About 90% of the students in both Indiana and in the Midwestern Region who took the SAT tests are white; this is about 8% higher than the 82% white for the Nation as a whole.

Only 9.3% of the Indiana students taking the tests were members of minority groups; this compares with 10.7% of all Midwesterners and nearly 18% Nationally.

The largest minority group is black (6.6% in Indiana, 7.2% in the Midwest, and 9.1% Nationally); the smallest minority group is the American Indian at about 1/2 of one percent. The greatest range differentials are for blacks in Indiana vs. National (Δ of 2.5%), and the Oriental group (Indiana 0.6% vs. 3.2% Nationally, a difference of 2.6%).



TABLE 12
ETHNIC BACKGROUND - BY SEX
WITH DIFFERENCES BETWEEN
BLACK, ORIENTAL, AND WHITE STUDENTS

| | INDIANA | | | MIDWESTERN | | | NATIONAL | | |
|------------|---------|-----|------|------------|-----|-------|----------|-----|-------|
| | BL | OR | WH | BL | OR | WH | BL | OR | WH |
| MALE | 6.0 | 0.7 | 91.1 | 5.8 | 1.4 | 90.4 | 7.8 | 3.4 | 83.0 |
| FEMALE | 7.1 | 0.5 | 90.3 | 8.6 | 1.1 | 88.3 | 10.4 | 3.0 | 81.3 |
| ALL | Male | | 8.9% | Male | | 9.6% | Male | | 17.0% |
| MINORITIES | Female | | 9.7% | Female | | 11.7% | Female | | 18.7% |

| | | Black | Oriental | White |
|-----------------|-----------|--------|----------|---------|
| N's for INDIANA | Males = | 951 | 114 | 14,519 |
| | Females = | 1,371 | 91 | 17,309 |
| MIDWESTERN | Males = | 3,645 | 854 | 56,383 |
| | Females = | 5,655 | 758 | 58,307 |
| NATIONAL | Males = | 33,327 | 14,517 | 356,998 |
| | Females = | 49,994 | 14,372 | 391,368 |

HIGHLIGHTS

Overall, more minority group females than males took the SAT tests in all three geographic regions--the one exception was in the Oriental group, where more males took the tests than did females.

The percentages vary by region; there is a smaller proportion of minorities in Indiana and the Midwestern Region than the Nation.

The greatest differential between sexes was in the Midwestern Region where there were 2.8% more black females than males--there was a 2.2% difference Nationally and only a 1.1% difference in Indiana.



TABLE 13
ANNUAL PARENTAL INCOME BY ETHNIC GROUP

| Ethnic Group | Indiana N=31,516 | | Midwestern N=114,290 | | National N=797,018 | |
|--------------|------------------|--------|----------------------|--------|--------------------|--------|
| | \$ Income | | \$ Income | | \$ Income | |
| | Mean | Median | Mean | Median | Mean | Median |
| Am. Indian | 22,300 | 19,600 | 25,000 | 20,400 | 22,100 | 17,800 |
| Black | 17,400 | 14,200 | 18,400 | 14,500 | 15,100 | 11,600 |
| Mex. Amer. | 21,700 | 19,100 | 23,300 | 19,200 | 18,400 | 15,300 |
| Oriental | 32,700 | 23,700 | 35,900 | 26,500 | 25,400 | 19,400 |
| P. Rican | 21,700 | 20,100 | 26,500 | 21,100 | 16,500 | 11,700 |
| White | 28,100 | 22,900 | 33,800 | 26,300 | 30,500 | 23,900 |
| Other | 22,900 | 19,000 | 31,900 | 24,300 | 23,100 | 17,100 |
| Unknown | 24,800 | 21,200 | 30,100 | 23,800 | 26,300 | 20,700 |
| All | 27,200 | 22,300 | 32,500 | 25,500 | 28,300 | 22,200 |

HIGHLIGHTS

The annual parental income was highest in the Midwestern Region; Indiana was closer to the National averages than the Midwestern averages.

The lowest ethnic group parental income was for blacks, the next lowest was Puerto Ricans, then Mexican Americans. The highest parental income was for whites, followed by Oriental, then American Indian.

The largest difference between mean and median parental income is reported for the Midwestern Region (Δ is \$7,000); this is followed by the National difference of \$6,100 and only \$4,900 for Indiana.

(Other and Unknown are not included in above discussion.)



TABLE 14
ESTIMATED PARENTAL CONTRIBUTION TOWARDS APPLICANTS' EDUCATION

| Ethnic Group | Indiana N=36,281 | | Midwestern N=132,099 | | National N=948,738 | |
|--------------|----------------------|--------|----------------------|--------|----------------------|--------|
| | \$ Contribution Mean | Median | \$ Contribution Mean | Median | \$ Contribution Mean | Median |
| Am. Indian | 1,590 | 700 | 1,830 | 770 | 1,500 | 440 |
| Black | 1,070 | 70 | 1,190 | 120 | 750 | 0 |
| Mex. Amer. | 1,190 | 420 | 1,420 | 480 | 900 | 50 |
| Oriental | 2,640 | 950 | 3,270 | 1,360 | 1,850 | 520 |
| P. Rican | 1,420 | 490 | 2,210 | 610 | 870 | 0 |
| White | 2,260 | 1,050 | 2,980 | 1,530 | 2,590 | 1,160 |
| Other | 1,600 | 440 | 2,610 | 1,060 | 1,610 | 330 |
| Unknown | 1,810 | 830 | 2,480 | 1,080 | 2,020 | 730 |
| All | 2,160 | 960 | 2,830 | 1,380 | 2,320 | 920 |

HIGHLIGHTS

The highest parental contributions toward applicants' education was made in the Midwestern Region; Indiana and the National contributions were fairly close to each other, but were at lower levels. This ranking is consistent with annual parental income.

The lowest ethnic group parental contribution for education was for blacks, the next lowest contribution was for Puerto Ricans, then Mexican Americans. The highest parental contribution was for whites, followed by Oriental, then American Indian.

The largest difference between the mean and median parental contribution is reported for the Midwestern Region (Δ \$1,450); this is followed by a National difference of \$1,400 and \$1,200 for Indiana. This sequence is parallel to annual parental incomes reported in Table 13.

(Other and Unknown are not included in the above discussion.)

*There is a direct relationship between parental income and parental contribution towards applicants' education. The overall rank order by ethnic group, from highest to lowest parental income and contribution levels, is:

- | | |
|--------------------|---------------------|
| 1. White | 4. Mexican American |
| 2. Oriental | 5. Puerto Rico |
| 3. American Indian | 6. Black |

TABLE 15
ANNUAL PARENTAL INCOME BY APPLICANTS' SAT SCORE AVERAGES

| SAT Average | Indiana N=30,889 \$ Income | | Midwestern N=112,477 \$ Income | | National N=780,989 \$ Income | |
|----------------|-------------------------------|--------|-----------------------------------|--------|---------------------------------|--------|
| | Mean | Median | Mean | Median | Mean | Median |
| <350 | 23,100 | 19,400 | 25,200 | 19,900 | 20,700 | 16,500 |
| 350-399 | 26,500 | 22,100 | 30,700 | 24,100 | 26,300 | 20,700 |
| 400-449 | 27,700 | 22,600 | 32,600 | 25,200 | 28,400 | 22,400 |
| 450-499 | 28,700 | 23,300 | 34,100 | 26,400 | 30,200 | 23,700 |
| 500-549 | 30,100 | 23,900 | 35,000 | 27,100 | 31,700 | 24,900 |
| 550-599 | 30,900 | 24,900 | 35,100 | 28,000 | 33,200 | 26,100 |
| 600-649 | 30,600 | 24,900 | 35,900 | 28,300 | 34,800 | 27,400 |
| >650 | 33,300 | 26,800 | 36,100 | 28,800 | 36,900 | 29,300 |
| NO SAT | 20,900 | 17,900 | 27,800 | 21,900 | 24,600 | 18,800 |
| ALL | 27,200 | 22,300 | 32,500 | 25,500 | 28,300 | 22,200 |

HIGHLIGHTS

At least three conclusions can be drawn from the data in Table 15. They are

1. There is a direct relationship between SAT scores and parental income: the higher the parental income (both mean and median) the higher the SAT average score of the applicant (with one minor exception, which is a slight inversion for Indiana mean income at the SAT 600-649 level).

2. Parental income is lower in Indiana than are the mean and median incomes for the Midwestern Region and National incomes; with the important exceptions of the low SAT scores Nationally (<449) at the lower income levels.

3. Parental incomes are higher in the Midwestern Region at all SAT levels except for >650.

NOTE: An examination of details in the three College Board reports identified on the first page of this monograph reveals a more even distribution of parental income in Indiana across all income groups and SAT score levels. This may again reflect the fact that a higher proportion of Indiana high school students take these tests.

TABLE 16
ESTIMATED PARENTAL CONTRIBUTION
TOWARDS APPLICANT'S EDUCATION
BY SAT AVERAGE

| SAT Average | Indiana N=30,889 \$ Contribution | | Midwestern N=112,477 \$ Contribution | | National N=780,980 \$ Contribution | |
|----------------|-------------------------------------|--------|---|--------|---------------------------------------|--------|
| | Mean | Median | Mean | Median | Mean | Median |
| <350 | 1,620 | 600 | 1,890 | 640 | 1,360 | 280 |
| 350-399 | 2,080 | 910 | 2,550 | 1,140 | 2,010 | 750 |
| 400-449 | 2,180 | 970 | 2,800 | 1,340 | 2,290 | 920 |
| 450-499 | 2,390 | 1,040 | 3,010 | 1,520 | 2,530 | 1,080 |
| 500-549 | 2,530 | 1,170 | 3,120 | 1,640 | 2,740 | 1,310 |
| 550-599 | 2,650 | 1,360 | 3,190 | 1,740 | 2,980 | 1,510 |
| 600-649 | 2,530 | 1,300 | 3,280 | 1,810 | 3,210 | 1,710 |
| >650 | 3,090 | 1,590 | 3,410 | 1,900 | 3,590 | 1,970 |
| NO SAT | 1,370 | 400 | 2,280 | 850 | 1,950 | 530 |
| ALL | 2,160 | 960 | 2,830 | 1,380 | 2,320 | 920 |

HIGHLIGHTS

At least three conclusions can be drawn from the data in Table 16. They are

1. There is a direct relationship between parental contribution and SAT score of students. The higher the parental contribution (both mean and median), the higher the SAT average score of the applicant. There was only one minor exception, a slight inversion for Indiana at the 600 SAT level.

2. Parental contributions toward the applicants' education are lower in Indiana than they are for the Midwestern Region and National averages, with the exceptions of <449 SAT scores Nationally.

3. The parental contributions made by parents in the Midwestern Region are well above the National averages with only one minor exception (i.e., ≥650 SAT level).

There is also a direct relationship between parental income (reported in Table 15 on preceding page) and the parental contribution towards an applicant's education.

IV. COLLEGE PLANS

TABLE 17
DEGREE-LEVEL GOALS
(Percent Distribution)

| Planned Degree Level | Indiana N=35,417 | | | Midwestern N=129,728 | | | National N=923,507 | | |
|-----------------------------------|------------------|--------|-------|----------------------|--------|-------|--------------------|--------|-------|
| | Male | Female | Total | Male | Female | Total | Male | Female | Total |
| Two-Yr. Training Program | 5.7% | 6.8% | 6.3% | 2.4% | 3.1% | 2.7% | 3.2% | 3.4% | 3.3% |
| Assoc. in Arts ^o | 2.4% | 5.0% | 3.8% | 1.0% | 2.3% | 1.7% | 1.5% | 3.4% | 2.5% |
| BA or BS Degree | 31.1% | 28.6% | 29.7% | 28.5% | 32.8% | 30.7% | 30.3% | 32.7% | 31.6% |
| MA or MS Degree | 21.3% | 20.0% | 20.6% | 27.4% | 24.5% | 25.9% | 26.2% | 23.4% | 24.8% |
| MD, PhD, Other Profess. Degree | 13.6% | 9.8% | 11.6% | 22.9% | 17.8% | 20.3% | 19.5% | 15.6% | 17.5% |
| Undecided | 25.9% | 29.7% | 28.0% | 17.9% | 19.4% | 18.7% | 19.3% | 21.4% | 20.4% |
| | 100 % | 100 % | 100 % | 100 % | 100 % | 100 % | 100 % | 100 % | 100 % |
| 2 Yr. Program or Degree | 8.1% | 11.8% | 10.1% | 3.4% | 5.4% | 4.4% | 4.7% | 6.8% | 5.8% |
| Graduate Study | 34.9% | 29.9% | 32.2% | 50.2% | 42.3% | 46.2% | 45.7% | 39.0% | 42.2% |

HIGHLIGHTS

There are great differences in the degree level goals of Indiana students who take the College Boards as compared with those in the Midwestern Region or the Nation at large. (In fact, Midwesterners' goals as a whole are more similar to the National averages than they are to Indiana.)

Important differences include the following:

1. More than twice as many (proportionately) Indiana students than Midwesterners as a whole indicate their goals to be a two-year training or degree program (10.1% vs. 4.4%): Indiana is also much higher than the National percentage in this regard (10.1% vs. 5.8%). In all three regional groups, proportionately more females than males have chosen this two-year level goal.

2. At the BA or BS degree goal level, fewer than two percentage points separate the three main groups (29.7% for Indiana, 30.7% for the Midwestern Region, and 31.6% National). In Indiana, proportionately more males than females have the baccalaureate goal--which is reverse the situations in the Midwest and the Nation.

3. Whereas Indiana is highest at the two-year program goal level, it is lowest at the graduate level ($> 10\%$ Δ). In all cases, proportionately more males than females reported graduate level study goals.

A very important finding is that 28% of the Indiana students are undecided as to their degree level goals (nearly 30% of the female students). This compares with only 18.7% undecided in the Midwestern Region and 20.4% Nationally.

TABLE 18
PLANS TO ASK COLLEGE FOR SPECIAL ASSISTANCE*

| Type of Assistance | Indiana N=56,281 | Midwestern N=132,099 | National N=948,738 |
|------------------------|------------------|----------------------|--------------------|
| Educational Counseling | 34.8% | 37.2% | 34.3% |
| Voc/Career Counseling | 27.1% | 28.4% | 26.2% |
| Math Skills | 16.5% | 15.7% | 16.5% |
| Reading Skills | 11.3% | 12.2% | 11.7% |
| Writing Skills | 12.5% | 13.3% | 13.8% |
| Study Skills | 25.5% | 21.8% | 22.6% |
| Part-Time Work | 37.1% | 36.9% | 38.9% |
| Personal Counseling | 3.4% | 3.8% | 3.7% |
| % Seeking Assistance | 80.9% | 79.7% | 80.4% |

*Student could indicate more than one choice.

HIGHLIGHTS

An examination of this table shows a striking similarity between all three geographic groups in the types of assistance needed. The highest proportions of students report they need assistance in getting part-time work (~37%), as well as educational and career counseling (~35%). Nearly 22% said they needed assistance in developing study skills. It is also noteworthy about 16% plan to ask for assistance related to math skills, 13% need writing skills and 12% need reading skills help.

Fewer than four percent report they plan to ask colleges for personal counseling assistance.

TABLE 19
ADVANCED PLACEMENT PLANS

| Subject | Indiana N=17,902 | Midwestern N=70,943 | National N=480,382 |
|--------------|------------------|---------------------|--------------------|
| English | 26.1% | 27.2% | 23.1% |
| Math | 19.0% | 23.2% | 20.5% |
| For. Lang. | 14.1% | 15.0% | 10.6% |
| Bio-Sci. | 6.8% | 8.4% | 8.9% |
| Phys. Sci. | 8.3% | 11.1% | 9.5% |
| Soc. Studies | 10.7% | 13.4% | 12.7% |
| Art & Music | 7.7% | 6.8% | 6.6% |

HIGHLIGHTS

A higher percentage of students from the Midwestern states than from Indiana plan to apply for advanced placement in all subjects, with the one exception of art and music. The greatest spread is in math (19% for Indiana vs. 23.2% Midwestern).

A higher percentage of Indiana students, when compared with the National group, plan to apply for advanced placement in three subjects; English, foreign languages, and art & music; National percentages are larger for all other subjects.

In general, about half of the students who take honors courses in English, math, and foreign languages plan to seek advanced placement in that subject; between 25% and 40% of the students taking honors courses in the other subjects plan to seek related advanced placement. (These details not shown in Table 21.)

NOTE: The above data include both students who took an honors course as well as those who didn't. As expected, a much higher proportion of the honors course participants planned to request advanced placement.

HIGHLIGHTS (TABLE 20)

There is a remarkable similarity in the rank orders of intended areas of study--across the three geographic regions. The five most popular choices are (1) Business & Commerce, (2) Health & Medical, (3) Engineering, (4) and (5) Social Sciences and Education. It is interesting to note that Business & Commerce, Health & Medical, Social Sciences, and Communications rank about the same for both sexes. However, females favor Education, Art, and Psychology, while males favor Engineering, Computer areas, Architecture, Agriculture and the Physical Sciences.

It is noteworthy that more than one-third of all students have chosen Business & Commerce (~20%) and Health & Medical (~15%). The third most popular choice is Engineering at slightly over 11% (however, nearly 20% of all males select this area of study and only about 3% of the females do). The surge of females into the business area is a rather recent phenomenon. (See rank order table below.)

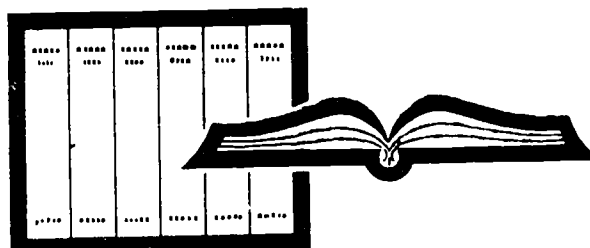
RANK ORDERS OF TEN MOST POPULAR INTENDED AREAS OF STUDY -- 1ST CHOICE

| Area | Indiana N=34,821 | | | Midwestern N=127,901 | | | National 935,159 | | |
|-----------------------------------|---------------------|----|----|-------------------------|----|----|---------------------|----|----|
| | M | F | Σ | M | F | Σ | M | F | Σ |
| Business and Commerce | 1 | 1 | 1 | 2 | 2 | 1 | 2 | 2 | 1 |
| Health and Medical | 3 | 2 | 2 | 3 | 1 | 2 | 3 | 1 | 2 |
| Engineering | 2 | 10 | 3 | 1 | 9 | 3 | 1 | 11 | 3 |
| Education | 6 | 3 | 4 | 11 | 3 | 5 | 11 | 3 | 5 |
| Social Sciences | 4 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 4 |
| Art | 11 | 4 | 6 | 12 | 5 | 7 | 12 | 5 | 8 |
| Computer Science/Systems Analysts | 5 | 7 | 7 | 5 | 10 | 7 | 5 | 9 | 7 |
| Undecided | 7 | 6 | 8 | 6 | 7 | 6 | 6 | 7 | 6 |
| Communications | 8 | 9 | 9 | 8 | 8 | 7 | 8 | 8 | 9 |
| Psychology | 19 | 8 | 10 | 16 | 6 | 11 | 16 | 6 | 10 |
| Architecture/Environmental Design | 9 | 22 | 15 | 9 | 17 | 13 | 9 | 21 | 13 |
| Agriculture | 10 | 18 | 12 | 13 | 17 | 16 | 13 | 16 | 14 |
| Physical Sciences | 13 | 21 | 16 | 7 | 15 | 12 | 9 | 16 | 12 |
| Biological Sciences | 13 | 12 | 12 | 10 | 10 | 10 | 7 | 10 | 11 |

See Table 20 for SAT scores by intended fields of study.

TABLE 20
INTENDED AREAS OF STUDY - FIRST CHOICE 1980

| | INDIANA | | | MIDWESTERN | | | NATIONAL | | |
|--|-----------|----------|---------|------------|----------|---------|------------|----------|---------|
| | N= 34,821 | | | N= 127,901 | | | N= 806,259 | | |
| N= | 15,713 | 19,108 | | 61,997 | 65,904 | | 426,254 | 480,005 | |
| | Male % | Female % | Total % | Male % | Female % | Total % | Male % | Female % | Total % |
| Arts and Humanities | 11.4 | 13.0 | 12.3 | 9.8 | 13.9 | 11.9 | 10.1 | 14.2 | 12.3 |
| Architecture/Environmental Design | 3.6 | 0.6 | 1.9 | 3.2 | 1.0 | 2.1 | 3.3 | 0.9 | 2.0 |
| Art | 2.9 | 5.8 | 4.5 | 2.0 | 5.2 | 3.7 | 2.3 | 5.8 | 4.1 |
| English/Literature | 0.8 | 1.4 | 1.1 | 1.0 | 2.1 | 1.5 | 0.9 | 2.0 | 1.5 |
| Foreign Languages | 0.3 | 1.3 | 0.9 | 0.3 | 1.4 | 0.8 | 0.3 | 1.4 | 0.9 |
| Music | 2.3 | 2.1 | 2.2 | 1.7 | 2.1 | 1.9 | 1.9 | 1.8 | 1.8 |
| Philosophy and Religion | 0.8 | 0.4 | 0.6 | 0.7 | 0.3 | 0.5 | 0.6 | 0.3 | 0.4 |
| Theater Arts | 0.9 | 1.4 | 1.2 | 0.9 | 1.8 | 1.3 | 0.9 | 2.0 | 1.5 |
| Biological Sciences and Related Areas | 15.1 | 24.1 | 20.1 | 16.6 | 25.5 | 21.2 | 16.5 | 24.5 | 20.7 |
| Agriculture | 3.3 | 1.1 | 2.1 | 1.8 | 1.0 | 1.4 | 2.1 | 1.1 | 1.6 |
| Biological Sciences | 2.4 | 1.9 | 2.1 | 3.1 | 3.1 | 3.1 | 3.6 | 3.3 | 3.4 |
| Forestry/Conservation | 1.7 | 0.7 | 1.1 | 1.2 | 0.6 | 0.9 | 1.6 | 0.6 | 1.0 |
| Health and Medical | 7.8 | 20.5 | 14.7 | 10.4 | 20.8 | 15.8 | 9.2 | 19.5 | 14.7 |
| Business, Commerce, and Communications | 23.6 | 25.4 | 24.6 | 22.7 | 22.5 | 22.6 | 21.9 | 22.6 | 22.3 |
| Business and Commerce | 19.7 | 22.1 | 21.0 | 19.3 | 18.5 | 18.9 | 18.5 | 18.8 | 18.6 |
| Communications | 3.9 | 3.3 | 3.6 | 3.4 | 4.0 | 3.7 | 3.4 | 3.8 | 3.6 |
| Physical Sciences and Related Areas | 28.1 | 7.5 | 16.8 | 31.1 | 9.1 | 19.8 | 29.9 | 8.5 | 18.6 |
| Computer Science/Systems Analysis | 5.3 | 3.8 | 4.4 | 4.4 | 3.1 | 3.7 | 4.9 | 3.5 | 4.2 |
| Engineering | 19.1 | 2.2 | 9.9 | 21.5 | 3.8 | 12.4 | 20.4 | 2.9 | 11.1 |
| Mathematics | 1.3 | 0.8 | 1.0 | 1.4 | 1.0 | 1.2 | 1.2 | 1.0 | 1.1 |
| Physical Sciences | 2.4 | 0.7 | 1.5 | 3.8 | 1.2 | 2.5 | 3.3 | 1.1 | 2.1 |
| Social Sciences and Related Areas | 13.2 | 23.6 | 18.9 | 13.3 | 23.2 | 18.4 | 14.3 | 23.8 | 19.1 |
| Education | 4.3 | 12.4 | 8.7 | 2.2 | 8.9 | 5.7 | 2.8 | 9.0 | 6.1 |
| Ethnic Studies | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Geography | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| History and Cultures | 0.9 | 0.3 | 0.6 | 0.7 | 0.4 | 0.6 | 0.8 | 0.4 | 0.6 |
| Home Economics | 0.1 | 1.3 | 0.7 | 0.0 | 1.2 | 0.6 | 0.1 | 1.1 | 0.6 |
| Library Science | 0.0 | 0.1 | 0.1 | 0.0 | 0.1 | 0.1 | 0.0 | 0.1 | 0.0 |
| Military Science | 0.9 | 0.1 | 0.5 | 1.1 | 0.1 | 0.6 | 1.4 | 0.1 | 0.7 |
| Psychology | 1.1 | 3.7 | 2.5 | 1.3 | 4.7 | 3.0 | 1.5 | 5.2 | 3.5 |
| Social Sciences | 5.8 | 5.7 | 5.7 | 7.8 | 7.8 | 7.8 | 7.7 | 7.8 | 7.8 |
| Miscellaneous | 8.6 | 6.3 | 7.3 | 6.4 | 5.8 | 6.1 | 7.2 | 6.4 | 6.8 |
| Other | 1.7 | 1.1 | 1.4 | 1.1 | 0.8 | 0.9 | 1.2 | 1.0 | 1.1 |
| Trade and Vocational | 2.7 | 1.4 | 2.0 | 1.2 | 0.7 | 1.0 | 1.3 | 0.9 | 1.1 |
| Undecided | 4.2 | 3.9 | 4.0 | 4.1 | 4.3 | 4.2 | 4.7 | 4.5 | 4.6 |



HIGHLIGHTS (TABLE 21)

There is a remarkable similarity in the rank orders of SAT Verbal and Math (mean) scores by intended major areas of study across all three geographic areas. The rank order comparisons below illustrate that fact:

RANK ORDERS OF SAT MEAN SCORES

| Area of Study | <u>Indiana</u> | | <u>Midwestern</u> | | <u>National</u> | |
|-------------------------------------|----------------|-------|-------------------|-------|-----------------|------|
| | Verbal | Math | Verbal | Math | Verbal | Math |
| Physical Sciences & Related Areas | 1st | 1st | 1st | 1st | 1st | 1st |
| Bio-Sciences & Related Areas | 2nd | 2nd | 2nd | 2nd | 3rd* | 2nd |
| Arts and Humanities | 3rd | 3-4th | 3rd | 3-4th | 2nd* | 3rd |
| Social Sciences & Related Areas | 4th | 3-4th | 4th | 3-4th | 4th | 4th |
| Business, Commerce & Communications | 5th | 5th | 5th | 5th | 5th | 5th |

**Only 1 point separates the National 2nd and 3rd Verbal rankings.*

It should also be noted in Table 20 (which is consistent with preceding data) Indiana's SAT scores are lower than those in the Midwestern Region and the Nation.

In comparing the differences between specific fields of study by verbal and math scores in Indiana, one finds

1. Students with the highest math scores chose mathematics--score of 566, physical science--541, engineering--521, computer science--490, and biological sciences at 489.

2. The few fields where verbal scores are higher than math scores include foreign languages, music, theater arts, and library science. Verbal and math scores were the same for those students choosing communications.

TABLE 21
SAT SCORES BY
INTENDENT AREAS OF STUDY - 1980

| | INDIANA | | MIDWESTERN | | NATIONAL | |
|--|--------------------|------------------|--------------------|------------------|--------------------|------------------|
| | 34,821 Total | | 127,901 Total | | 908,268 Total | |
| | SAT Verbal Mean | SAT Math Mean | SAT Verbal Mean | SAT Math Mean | SAT Verbal Mean | SAT Math Mean |
| Arts and Humanities | 410 | 436 | 453 | 472 | 434 | 452 |
| Architecture/Environmental Design | 404 | 482 | 429 | 511 | 415 | 491 |
| Art | 385 | 406 | 413 | 431 | 402 | 419 |
| English/Literature | 483 | 451 | 528 | 498 | 507 | 481 |
| Foreign Languages | 484 | 463 | 498 | 499 | 472 | 475 |
| Music | 427 | 442 | 461 | 478 | 436 | 455 |
| Philosophy and Religion | 434 | 465 | 479 | 505 | 460 | 477 |
| Theater Arts | 417 | 414 | 460 | 459 | 438 | 436 |
| Biological Sciences and Related Areas | 418 | 459 | 455 | 500 | 433 | 472 |
| Agriculture | 391 | 440 | 414 | 455 | 403 | 437 |
| Biological Sciences | 454 | 489 | 488 | 527 | 469 | 506 |
| Forestry/Conservation | 406 | 438 | 429 | 466 | 416 | 45 |
| Health and Medical | 417 | 460 | 453 | 501 | 429 | 470 |
| Business, Commerce, and Communications | 396 | 436 | 424 | 469 | 406 | 446 |
| Business and Commerce | 389 | 436 | 417 | 470 | 399 | 446 |
| Communications | 436 | 436 | 459 | 461 | 444 | 446 |
| Physical Sciences and Related Areas | 430 | 518 | 468 | 560 | 444 | 512 |
| Computer Science/Systems Analysis | 415 | 490 | 445 | 527 | 417 | 496 |
| Engineering | 429 | 521 | 465 | 562 | 444 | 535 |
| Mathematics | 437 | 566 | 476 | 606 | 455 | 577 |
| Physical Sciences | 479 | 541 | 517 | 581 | 495 | 560 |
| Social Sciences and Related Areas | 409 | 432 | 450 | 472 | 429 | 449 |
| Education | 388 | 416 | 407 | 437 | 389 | 418 |
| Ethnic Studies | - | - | 465 | 437 | 378 | 387 |
| Geography | 353 | 381 | 453 | 494 | 424 | 471 |
| History and Cultures | 438 | 439 | 493 | 490 | 481 | 474 |
| Home Economics | 359 | 386 | 394 | 423 | 385 | 414 |
| Library Science | 456 | 440 | 519 | 501 | 474 | 444 |
| Military Science | 416 | 457 | 452 | 501 | 434 | 478 |
| Psychology | 424 | 435 | 452 | 464 | 434 | 477 |
| Social Sciences | 436 | 457 | 480 | 500 | 456 | 473 |
| Miscellaneous | 395 | 438 | 438 | 481 | 419 | 459 |
| Other | 382 | 422 | 410 | 453 | 397 | 471 |
| Trade and Vocational | 354 | 399 | 362 | 408 | 352 | 394 |
| Undecided | 418 | 461 | 460 | 503 | 440 | 481 |

TABLE 22
HOUSING PREFERENCES

| Plan to Live | Indiana N=34,761 | | | Midwestern N=127,462 | | | National N=907,959 | | |
|------------------------|------------------|---------|-------|----------------------|---------|-------|--------------------|---------|-------|
| | 15,723 | 19,038 | Total | 61,813 | 65,649 | Total | 427,194 | 480,765 | Total |
| | Males | Females | | Males | Females | | Males | Females | |
| At Home | 17.5% | 22.5% | 20.3% | 15.2% | 17.1% | 16.2% | 22.8% | 26.3% | 24.6% |
| Single-Sex Dormitory | 24.0 | 31.4 | 28.0 | 19.3 | 30.7 | 25.2 | 16.7 | 27.2 | 22.3 |
| Coed Dorm | 35.7 | 28.5 | 31.8 | 45.5 | 37.2 | 41.2 | 38.8 | 30.4 | 34.4 |
| Fraternity or Sorority | 8.1 | 6.5 | 7.2 | 7.2 | 6.6 | 6.9 | 4.5 | 3.9 | 4.2 |
| On-Campus Apartment | 8.7 | 5.6 | 7.0 | 7.9 | 4.8 | 6.3 | 9.9 | 6.7 | 8.2 |
| Off-Campus Apartment | 6.0 | 5.5 | 5.7 | 4.8 | 3.6 | 4.2 | 7.4 | 5.6 | 6.4 |
| | 100 % | 100 % | 100 % | 100 % | 100 % | 100 % | 100 % | 100 % | 100 % |

HIGHLIGHTS

The majority of students prefer to live in a campus dormitory (males preferring coed, females preferring single-sex dorms).

Indiana and Midwestern students prefer to live in fraternity or sorority housing in greater proportions than do the National group; whereas a larger percentage of the National group preferred to live at home (particularly females).

The least popular choice for both Indiana and Midwestern Region students was off-campus apartments; however, the least popular Nationally was fraternity or sorority.

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ATTACHMENTS

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ATTACHMENT I

"Highlights" of NATIONAL REPORT of College-Bound Seniors--1980 22

ATTACHMENT II

Includes:

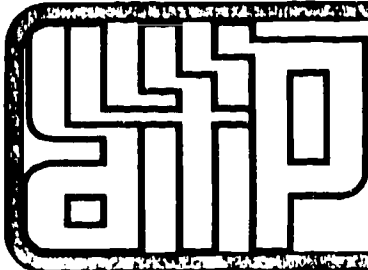
| | | |
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National Report

College-Bound Seniors, 1980

HIGHLIGHTS

- The number of women taking the Scholastic Aptitude Test (SAT) exceeded that of men for the sixth consecutive year.
- Business and commerce was the most popular area of intended college study. The larger part of this increase came from a dramatic rise in women's interest, which has increased almost three times since 1973 and now exceeds that of men.
- Interest in education declined again, sustaining a trend begun in 1973.
- The average SAT scores of the 1980 seniors for the verbal section declined 3 points from 427 in 1979 to 424; the mathematical scores declined 1 point from 467 to 466. The average scores for both sections are at their lowest level since these reports were first prepared in 1972.
- Men had higher SAT scores, both verbal and mathematical, but women continued to excel on the Test of Standard Written English (TSWE).
- The average TSWE score has declined each year since the test's introduction in 1975, more abruptly for women than men.
- The high school grade point average in academic subjects was 3.06 or B. The number of academic courses taken averaged 16.
- Nearly three-fourths of the students ranked in the highest two-fifths of their graduating class.
- Students took more courses in mathematics and physical sciences than ever before, but their study of foreign languages fell to an all-time low. The numbers of years of study in mathematics by women increased significantly for the second consecutive year.
- Despite the increase in the number of years mathematics is studied, scores on the SAT-mathematical section and the mathematical Achievement Tests declined.
- The percentage of ethnic minority students rose for the fifth consecutive year to an all-time high of 17.9 percent.
- The median estimated parental contribution toward college expenses was \$920. About 8 in 10 families cannot contribute fully to the costs of education at public four-year colleges with average annual expense budgets of \$3,049. About 9 in 10 cannot contribute fully to the \$6,082 annual costs at private four-year colleges.

Admissions Testing Program of the College Board
The College Board: 500 Davis St., Evanston, IL 60201.

ATTACHMENT II

TABLE 1
COLLEGE BOARD TREND DATA
ADMISSIONS TESTING PROGRAM
COLLEGE BOUND SENIORS
INDIANA AND NATIONAL

| SCHOLASTIC APTITUDE TESTS | | | | | | | CANDIDATES AS % OF ESTIMATED COLLEGE BOUND POPULATION | |
|---------------------------|--------|------|------|------|------------|-----------|---|----------|
| YEAR | VERBAL | | MATH | | CANDIDATES | | INDIANA | NATIONAL |
| | IND | NATL | IND | NATL | IND | NATIONAL | | |
| 1971-72 | 435 | 453 | 471 | 484 | 39,362 | 1,022,820 | | |
| 1972-73 | 429 | 445 | 470 | 481 | 35,644 | 1,014,853 | | |
| 1973-74 | 423 | 444 | 469 | 480 | 34,253 | 985,115 | | |
| 1974-75 | 418 | 434 | 463 | 472 | 35,883 | 996,428 | 113% | 66% |
| 1975-76 | 415 | 431 | 460 | 472 | 37,329 | 999,829 | 115% | 68% |
| 1976-77 | 412 | 429 | 458 | 470 | 38,296 | 979,344 | 137% | 67% |
| 1977-78 | 413 | 429 | 457 | 468 | 37,357 | 989,307 | 114% | 66% |
| 1978-79 | 412 | 427 | 455 | 467 | 37,682 | 991,765 | 111% | 63% |
| 1979-80 | 407 | 424 | 450 | 466 | 37,262 | 991,514 | 106% | 64% |

PSAT/NMSQT**
COLLEGE BOUND JUNIORS
INDIANA AND NATIONAL

| YEAR | PSAT/NMSQT | | | | CANDIDATES | | CANDIDATES AS % OF ESTIMATED COLLEGE BOUND POPULATION | |
|---------|------------|------|------|------|------------|-----------|---|-----|
| | VERBAL | | MATH | | | | | |
| | IND | NATL | IND | NATL | IND | NATIONAL | | |
| 1971-72 | | 42.2 | | 45.2 | 30,857 | 1,072,309 | | |
| 1972-73 | | 42.7 | | 46.9 | 30,699 | 1,039,387 | | |
| 1973-74 | | 41.8 | | 45.5 | 30,369 | 1,052,523 | | |
| 1974-75 | 41.4 | 41.6 | 46.6 | 45.9 | 30,133 | 1,079,769 | 95% | 79% |
| 1975-76 | 40.6 | 41.0 | 45.9 | 45.5 | 30,905 | 1,098,035 | 95% | 69% |
| 1976-77 | 39.9 | 40.5 | 45.4 | 45.0 | 31,684 | 1,106,128 | 113% | 81% |
| 1977-78 | 39.0 | 39.9 | 44.2 | 44.2 | 33,184 | 1,137,017 | 101% | 81% |
| 1978-79 | 39.3 | 40.6 | 44.4 | 44.8 | 32,519 | 1,120,931 | 96% | 72% |
| 1979-80 | 39.6 | 40.3 | 45.4 | 45.3 | 31,764 | 1,115,819 | 95% | 79% |

*Preliminary Scholastic Aptitude Tests and National Merit Scholarship Qualifying Test.

ATTACHMENT 11

TABLE 2
COLLEGE BOARD ADMISSIONS TESTING PROGRAM RESULTS 1979-80
MIDWESTERN STATES AND NATIONAL

| State | ATP Proportion of College Bound | SAT Verbal | SAT Math | State | PSAT/NMSQT Proportion of College Bound | PSAT Verbal | PSAT Math |
|-------------|---------------------------------------|---------------|-------------|-------------|--|----------------|--------------|
| Indiana | 106% | 407 | 450 | Indiana | 95% | 39.6 | 45.4 |
| Ohio | 36% | 455 | 499 | Minnesota | 82% | 40.9 | 47.5 |
| Michigan | 32% | 452 | 505 | Michigan | 80% | 39.6 | 45.5 |
| Missouri | 25% | 458 | 503 | Ohio | 76% | 40.9 | 46.0 |
| Illinois | 25% | 459 | 507 | Missouri | 71% | 41.2 | 46.3 |
| Wisconsin | 19% | 472 | 533 | Illinois | 69% | 39.8 | 45.3 |
| W. Virginia | 18% | 462 | 499 | Nebraska | 60% | 40.6 | 47.5 |
| Minnesota | 13% | 491 | 544 | W. Virginia | 53% | 41.2 | 45.8 |
| Nebraska | 11% | 484 | 539 | Kansas | 50% | 41.4 | 47.5 |
| Kansas | 9% | 497 | 538 | Wisconsin | 50% | 42.6 | 49.6 |
| S. Dakota | 5% | 500 | 551 | S. Dakota | 36% | 43.1 | 49.7 |
| Iowa | 5% | 508 | 554 | Iowa | 35% | 44.2 | 51.3 |
| N. Dakota | 3% | 499 | 549 | N. Dakota | 20% | 43.1 | 50.1 |
| NATIONAL | 64% | 424 | 466 | NATIONAL | 79% | 40.3 | 45.3 |

NOTE: ATP is the Admissions Testing Program of the College Board,
SAT is the Scholastic Aptitude Test, a part of the ATP program, usually
taken by high school seniors, and
PSAT/NMSQT is the Preliminary Scholastic Aptitude Test/National Merit
Scholarship Qualifying Test usually taken by high school juniors.



For statistical analysis
and related findings,
please see facing page
(page 25).

ATTACHMENT II (CONTINUED)

STATISTICAL ANALYSIS OF COLLEGE BOARD ATP RESULTS 1979-80 (Data from Table 2 on facing page)

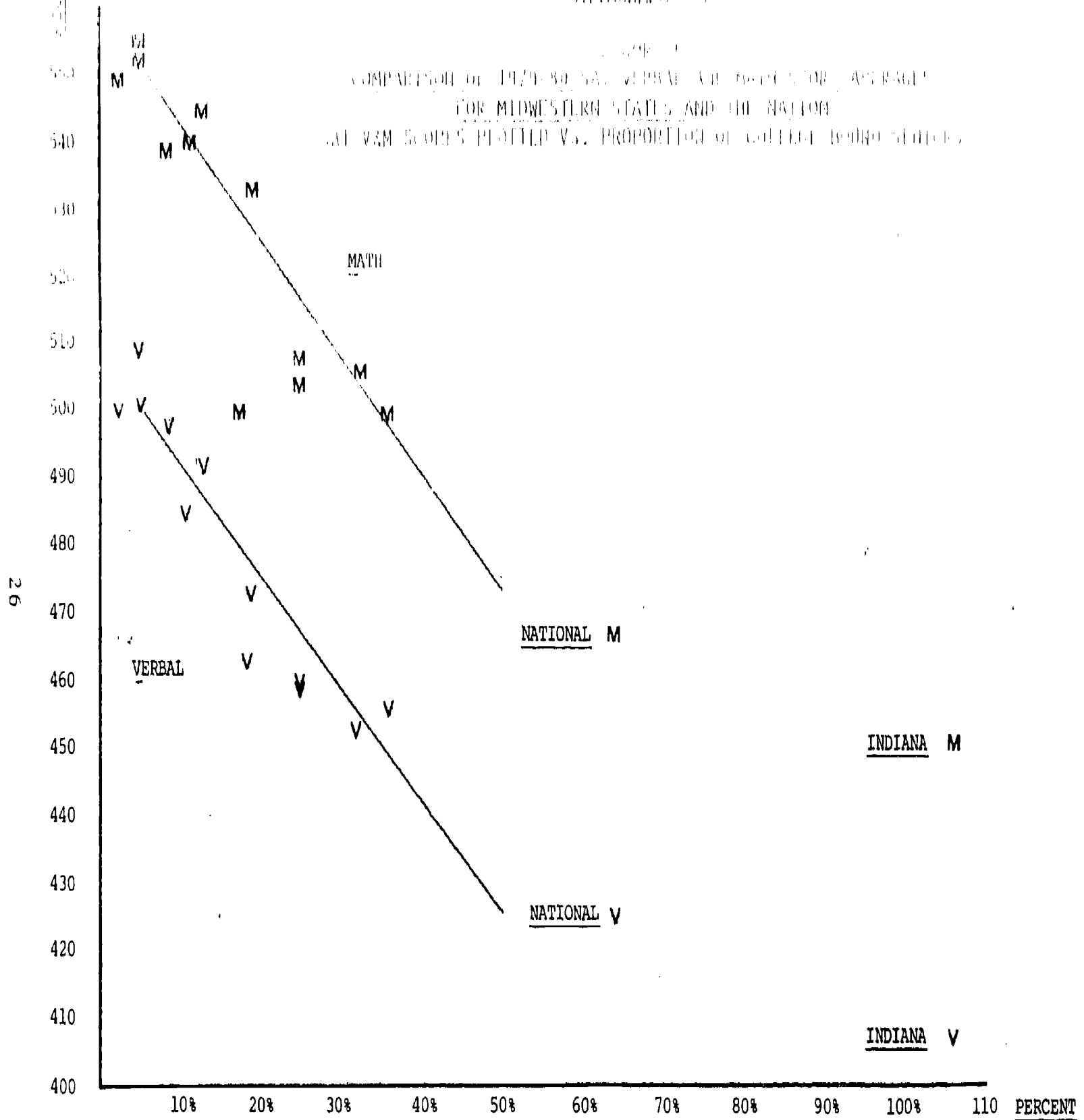
1. A correlation coefficient measures the strength of the relationship between two variables. A correlation can range from -1.00 to +1.00. If the correlation between two variables is near +1.00 then they have a very strong relationship, that is, if you know a subject's score on one of the variables you can predict very accurately that subject's score on the other variable. In addition, a positive correlation means that high values of one variable are paired up with high values on the other variable. On the other hand, if the correlation between two variables is near -1.00 then they have a very strong negative relationship; you can predict very accurately a subject's score on one variable from the other variable, but the variables are inversely related, so that a high value on one variable pairs up with a low value on the other variable. A correlation near 0.00 between two variables means that they seem unrelated; if you know a subject's score on one variable you cannot predict that subject's score on the other variable.
2. The correlations reported in this study indicate the relationship between: a) the proportion of college-bound students within a state who take the standardized admissions tests, and b) the average score, within the state, of those students on the tests. Because the correlations all are very high negative values it is clear that large proportions taking a test are closely related to low average scores on the test.

| PEARSON CORRELATION COEFFICIENTS | | | | | |
|-----------------------------------|---------|--------|--------|--------|--------|
| | PROPATP | SAT-V | SAT-M | PSAT-V | PSAT-M |
| PROPATP | | -.9104 | -.8974 | | |
| PROPPSAT | .7182 | | | -.8592 | -.8118 |
| KENDALL CORRELATION COEFFICIENTS | | | | | |
| PROPATP | | -.8572 | -.7190 | | |
| PROPPSAT | .7182 | | | -.7551 | -.6316 |
| SPEARMAN CORRELATION COEFFICIENTS | | | | | |
| PROPATP | | -.9642 | -.8828 | | |
| PROPPSAT | .7182 | | | -.8741 | -.7635 |

PROPATP Proportion of college-bound taking SAT
 SAT-V Average SAT-Verbal
 SAT-M Average SAT-Math
 PROPPSAT Proportion of college-bound taking PSAT
 PSAT-V Average PSAT-Verbal
 PSAT-M Average PSAT-Math

NOTE: All correlation coefficients were significantly different from zero beyond the .01 level.

FIGURE 11
COMPARISON OF 1979-80 SAT VERBAL AND MATH TOP AVERAGE
FOR MIDWESTERN STATES AND THE NATION
SAT VAM SCORES PLOTTED V.S. PROPORTION OF COLLEGE-BOUND STUDENTS

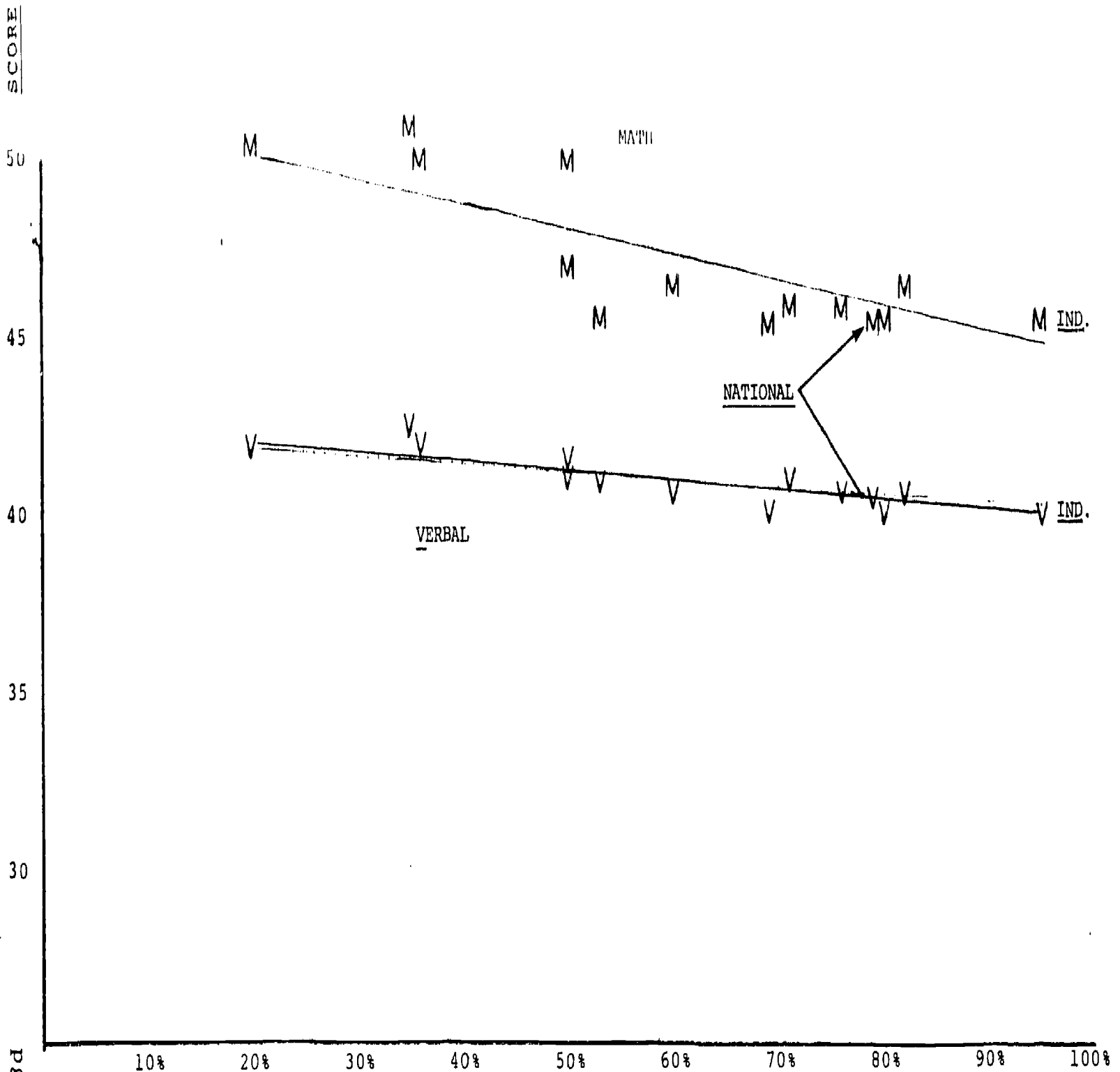


Estimated percentage of college-bound students taking tests.

ATTACHMENT 11

FIGURE 2

COMPARISON OF 1979-80 PSAT/NMSQT VERBAL AND MATH SCORE AVERAGES
FOR MIDWESTERN STATES AND THE NATION
PSAT/NMSQT V&M SCORES PLOTTED VS. PROPORTION OF COLLEGE-BOUND STUDENTS



Estimated percentage of college-bound students taking tests.

ATTACHMENT III

AMERICAN COLLEGE TESTING PROGRAM* INDIANA VS. NATIONAL SCORE COMPARISONS

The premise was developed from SAT scores data and illustrations presented earlier, that the larger the proportional group of high school students in a given population who take the college (admissions) tests, the lower the mean/median their scores will be. Specifically, Indiana had a higher proportion taking the tests--and they scored lower than did the Midwestern Region and National populations. The premise is supported in the case of high school students taking the ACT* tests; however, the proportions and scores are reversed. In the ACT situation, a lower proportion of Indiana students took the tests--but scored higher in every subject tested than did the National population. See details in table below.

ACT HIGH SCHOOL PROFILES INDIANA VS NATIONAL COMPARISONS by Subject and Composite Scores

| STD SCORE | ENGLISH | | MATH | | SOCIAL STUDIES | | NATURAL SCIENCES | | COMPOSITE | |
|--------------|---------|------|------|------|-------------------|------|---------------------|------|-----------|------|
| | IND | NATL | IND | NATL | IND | NATL | IND | NATL | IND | NATL |
| 26-36 | 7% | 6% | 17% | 18% | 18% | 16% | 27% | 26% | 14% | 13% |
| 21-25 | 31% | 29% | 22% | 19% | 22% | 21% | 26% | 26% | 27% | 25% |
| 16-20 | 32% | 31% | 22% | 22% | 22% | 19% | 29% | 28% | 30% | 29% |
| 1-15 | 30% | 33% | 39% | 42% | 37% | 44% | 18% | 20% | 29% | 33% |

Comparisons of Means and Standard Deviations

| | | | | | | | | | | |
|------------------------------|------|------|------|------|------|------|------|------|------|------|
| Mean | 18.3 | 17.9 | 17.9 | 17.4 | 18.0 | 17.2 | 21.4 | 21.1 | 19.0 | 18.5 |
| S.D. | 5.3 | 5.4 | 7.4 | 7.6 | 7.2 | 7.3 | 6.1 | 6.2 | 5.6 | 5.8 |
| Statistically Significant | .001 | | .001 | | .001 | | .01 | | .001 | |

N's = INDIANA 2,531 NATIONAL 82,220 (10% sample)

*Source: American College Testing Program, High School Profile Report.
Students tested in 1979-80 school year. State composite for Indiana.

The finding that large proportions of students taking these tests are closely related to low average scores on the tests is supported statistically. See facing page.

ATTACHMENT III (CONTINUED)
(See facing page for related data)

ACT STATISTICAL SIGNIFICANCE
COMPUTATIONS

$$S_{\bar{X}_1} = \frac{S_1}{\sqrt{N_1 - 1}} = \frac{S_1}{\sqrt{2530}} = \frac{S_1}{50.299} \quad S_{\bar{X}_2} = \frac{S_2}{286.739}$$

| | <u>ENG.</u> | <u>MATH</u> | <u>SS</u> | <u>NAT SC</u> | <u>COMP</u> |
|-----------------|-------------|-------------|-----------|---------------|-------------|
| S_1 | = 5.3 | 7.4 | 7.2 | 6.1 | 5.6 |
| $S_{\bar{X}_1}$ | = .1054 | .1471 | .1431 | .1213 | .1113 |
| S_2 | = 5.4 | 7.6 | 7.3 | 6.2 | 5.8 |
| $S_{\bar{X}_2}$ | = .0188 | .0265 | .0255 | .0216 | .0202 |

$$S_{D\bar{X}} = \sqrt{S_{\bar{X}_1}^2 + S_{\bar{X}_2}^2} = \sqrt{.0111 + .0004} = \sqrt{.0115} = .1072 \text{ (ENG)}$$

$$\sqrt{.0216 + .0007} = \sqrt{.0223} = .1493 \text{ (MATH)}$$

$$\sqrt{.0205 + .0006} = \sqrt{.0211} = .1453 \text{ (SS)}$$

$$\sqrt{.0147 + .0005} = \sqrt{.0152} = .1233 \text{ (NS)}$$

$$\sqrt{.0124 + .0004} = \sqrt{.0128} = .1131 \text{ (COMP)}$$

$$Z = \frac{\bar{X}_1 - \bar{X}_2}{S_{D\bar{X}}} = \frac{18.3 - 17.9}{.1072} = \frac{.4}{.1072} = 3.73*** \text{ (.001) (ENG)}$$

$$= \frac{17.9 - 17.4}{.1493} = \frac{.5}{.1493} = 3.35*** \text{ (.001) (MATH)}$$

$$= \frac{18.0 - 17.2}{.1453} = \frac{.8}{.1453} = 5.51*** \text{ (.001) (SS)}$$

$$= \frac{21.4 - 21.1}{.1233} = \frac{.3}{.1233} = 2.43** \text{ (.01) (NS)}$$

$$= \frac{19.0 - 18.5}{.1131} = \frac{.5}{.1131} = 4.42*** \text{ (.001) (COMP)}$$

ATTACHMENT IV

STATISTICAL ANALYSIS OF TABLE 1 SAT TEST SCORES (from page 1)

A two-step process was employed to test the difference between Indiana, Midwestern, and National averages on the SAT. This process was used separately for SAT Verbal averages and SAT Math averages. In step 1 of the process, a one-way analysis of variance procedure was employed in order to determine whether there was any significant difference among the means of the three groups. For both the SAT Verbal and SAT Math averages the analysis of variance indicated a very large statistical significance, that is, the means of the three groups differed. In the second step of the process each group was compared to each other group using a Newman-Keuls followup test. For both the SAT Verbal and SAT Math averages every group was different from every other. This two-step process (first an analysis of variance, then a Newman-Keuls followup) is the standard statistical procedure for testing more than two means against one another. The process is more conservative than using a set of t-tests to test every possible pair of means; a set of t-tests would be likely to overestimate how many group means were different.

$F_{\text{critical}} (2, \infty, \alpha=.01)=4.61$ F value necessary in order to be significant.
 $F_{\text{observed}} (\text{SATV})=2,901.$ F obtained from SAT-V.
 $F_{\text{observed}} (\text{SATM})=3,553.$ F obtained from SAT-M.

$$\text{SATV: } \sqrt{\frac{\text{MS error}}{n}} = \sqrt{\frac{11977.107}{57941.656}} = \sqrt{.2067097} = .4546533$$

Critical value for difference between 2 means =

$$q(n, df) * \sqrt{\frac{\text{MS error}}{n}} = q(n, df) * .4546533$$

$$q(2, \infty) * .4546533 = 3.64 * .4546533 = \boxed{1.654938} (\alpha=.01)$$

$$q(3, \infty) * .4546533 = 4.12 * .4546533 = \boxed{1.873172} (\alpha=.01)$$

Differences between means = (446-407 = 39) (446-424 = 22) (424-407 = 17)
∴ all means are significantly different.

$$\text{SATM: } \sqrt{\frac{\text{MS error}}{n}} = \sqrt{\frac{13664.314}{57941.656}} = \sqrt{.2358288} = .485622$$

Critical value for difference between 2 means =

$$q(n, df) * \sqrt{\frac{\text{MS error}}{n}} = q(n, df) * .485622$$

$$q(2, \infty) * .485622 = 3.64 * .485622 = \boxed{1.767664} (\alpha=.01)$$

$$q(3, \infty) * .485622 = 4.12 * .485622 = \boxed{2.0007626} (\alpha=.01)$$

Differences between means = (493-450 = 43) (493-466 = 27) (466-450 = 16)
∴ all means are significantly different.